PROPOSED
WETCAT STRATEGIES AND MEASURES

Strategy I: Water Recycling

Draft Measure 1: Require Water Recycling Plans at Wastewater Treatment Plants
Agency: State Water Resources Control Board

Energy production is a significant source of greenhouse gas emissions. Approximately 19% of electricity and 30% of natural gas (non-power plant) consumed in California are used to deliver, treat, and dispose of water. Long-distance water conveyance, such as that from Northern to Southern California, accounts for a significant portion of the energy used to provide water.

Water recycling reduces energy use by providing local water more efficiently than importing "new" water from nonlocal sources. This CAT measure proposes that NPDES permits be amended to require preparation and implementation of water recycling plans at wastewater treatment plants (WWTPs) in communities that rely on imported water supplies.

Modern treatment facilities are capable of producing wastewater that is suitable for recycling. The publication Water Recycling 2030: Recommendations of California's Recycled Water Task Force reports that approximately 10% of municipal wastewater in California is being recycled, but as much as 23% of the municipal wastewater flow could be recycled. This CAT measure will help achieve the 23% recycling goal by 2030. Finding suitable markets and funding treatment and distribution system costs are challenges to increasing the use of recycled water.

A substantial energy savings could be realized if recycled wastewater was used to replace potable water in appropriate applications such as irrigation. The amount of energy required to import or recycle water varies widely throughout the state. The California Energy Commission (CEC) has reported that water supply and conveyance of water from northern to southern California consumes an estimated 3.2± Megawatt hours per acre-foot (MWh/AF). In sharp contrast, the estimated cost to recycle wastewater is approximately 0.7± MWh/AF. As a result, the potential energy savings that could be realized through water recycling is estimated as 2.5 MWh/AF for southern California communities that import water.

Strategy II: Urban Water Reuse

Draft Measure 1: Urban Water Reuse
Agency: State Water Resources Control Board

Energy production is a significant source of greenhouse gas emissions. Approximately 19% of electricity and 30% of natural gas (non-power plant) consumed in California are used to deliver, treat, and dispose of water. Long-distance water conveyance, such as that from Northern to Southern California, accounts for a significant portion of the energy used to provide water.

This CAT measure proposes to evaluate the potential benefits of an urban water reuse strategy. Although urban water reuse may have the potential to achieve energy and emission reductions by reducing the use of new water, sufficient information is not available at this time to quantify the volume of water that could be captured and reused, or the energy savings that could be realized. This measure is being evaluated for future consideration.

Urban Water Reuse reduces energy consumption by capturing runoff, discharged water, and leaking water from urban sources, and reusing that water for local applications such as irrigation instead of "new" water that requires more energy to provide. This strategy capitalizes on passive stormwater treatment techniques, such as Low Impact Development (LID), to promote infiltration rather than the discharge of urban stormwater runoff. Water provided by these techniques could be captured or intercepted by urban water reuse projects.

Urban communities consume less water during the winter season when water is more readily available, but demand greater amounts of water in the summer when water is least available. However, water escapes from the urban environment all year. Much of this water originates as runoff from irrigation and sprinklers, but water also escapes from incidental home and lawn chores, leaking water lines and other activities. Although these types of sources are not particularly concentrated or of large volume, the relatively continuous flows that collect in storm drains, roadside ditches, or other low lying areas may represent reliable sources for local reuse.

Communities may be able to increase the efficiency and reliability of urban water reuse by designing facilities to capture water for reuse, such as underground storage beneath parks, small surface basins in drainages, or the creation of catch basins or sumps downhill of development. Depending on the source and application, reused water may be suitable for use without the need for additional treatment, or may be blended with recycled water to bolster local supplies.

Strategy III: End Use Water Conservation and Efficiency

Draft Strategy: Reduction of Greenhouse Gas Emissions through Water Use Efficiency
Agencies: Department of Water Resources, State Water Resources Control Board, California Energy Commission

The Governor has identified conservation as one of the key ways to provide water for Californians and protect and improve the Delta ecosystem. He has directed state agencies to develop and implement a more aggressive plan to help achieve a 20 percent reduction in per capita water use statewide by 2020. This directive builds upon the *California Water Plan Update 2005*, which identified water use efficiency as a "foundational action" for California water management.

To implement this goal, DWR is collaborating with the California Energy Commission, the California Public Utilities Commission and the State Water Resources Control Board to develop and implement various measures and strategies to increase water use efficiency and thereby reduce greenhouse gas emissions related to water use. To support this implementation, this conservation initiative will need to utilize the many Integrated Regional Water Management (IRWM) planning efforts throughout California. During 2008, the four-agency group will collaboratively prepare a statewide water use efficiency measure for consideration in the Public Review Draft of the California Water Plan Update 2009.

California will achieve 1.76 MAF of urban water savings by 2020 to meet the Governor's call for a 20 percent per capita reduction in statewide water use:

The California Public Utilities Commission 2005 Water Action Plan adopted the principle of efficient use of water and the objective of strengthening water conservation programs to a level comparable to those of energy utilities. It states that "The Commission will use existing tools to strengthen utility conservation programs, and will provide the necessary direction to do so by initiating formal proceedings where appropriate." Measures for achieving the directed water conservation target include:

- Best Management Practices
- Appliance Efficiency Standards
- Landscape Water Conservation
- Irrigation Efficiency
- Analytical Tools

Total Annual water savings (including savings from code enforcement) of 1.76 MAF can be achieved through 2020. It is assumed that local agencies are implementing locally cost-effective water conservation measures.

Strategy IV: Energy Intensity of Water System

•Draft Measure 1: Implement cost effective energy efficiency measures in water system infrastructure projects
Agencies: Department of Water Resources, Water Resources Control Board, California Energy Commission, and California Public Utilities Commission.

To meet the needs of Californians, the state's water systems include natural and man-made facilities for the capture, storage, conveyance, treatment, distribution and re-use of water, requiring energy at nearly every step. Consistent with the recommendations of the *California Water Plan Update 2005* and 2005 Integrated Energy Policy Report, this measure seeks to reduce the magnitude[1] and intensity[2] of the California's water systems through the further implementation of energy efficiency measures (more efficient technologies, re-operation and or re-design) in infrastructure projects.

Setting a target of a 10 percent reduction from 2006 levels would yield a savings of 2,200 GWh and a reduction of 20 percent would yield a savings of 4,400 GWh per year. This reduction in electricity consumption would in turn reduce the GHG emission associated with this amount of electricity generation. An assessment of actual potential is needed to determine if such targets are reasonable.

•Draft Measure 2: Construct tools and protocols to evaluate, measure, and verify the energy impacts of water system and end use conservation and efficiency activities/programs
Agencies: California Public Utilities Commission, California Energy Commission, Department of Water Resources, and State Water Resources Control Board

To accurately assess the amount of potential Greenhouse Gas Emission reductions that are possible from implementing either water-related efficiency and conservation measures or developing low carbon intense water related renewable resources, various tools are needed to evaluate, measure and verify in more detail the amount of energy saved at various stages upstream and downstream of the conservation or efficiency activity or effort.

Use of these tools will assist in program implementation and evaluation of program effectiveness. These tools can assist water agencies and regional boards determine the most effective measures to implement as part of their water management strategies under existing requirements. These tools will be beneficial to ensuring the cost-effectiveness of projects and governmental accountability.

•Draft Measure 3: Conduct research and demonstration projects that explore ways to reduce the energy intensity of the water use cycle and better manage the energy demand of the water system.
Agency: California Energy Commission – PIER

Evaluate and conduct research to: deploy advanced emerging technologies in the water system to lower energy intensity; examine opportunities to shift loads off peak; integrate into the grid intermittent renewable generation from water systems; and better understand the interaction of water and energy within the state and identify new and innovative technologies and measures for mutually achieving energy and water efficiency savings.

[1] Total energy consumed by a particular segment of the water use cycle. Peak demand is usually measured in megawatts and annual consumption in kilowatt-hours or megawatt hours.
[2] Total energy consumed per unit of water to perform a water management-related action, such as desalting, conveyance, etc… This demand is usually measured in kilowatt-hours per million gallons.

Strategy V: Increase Renewable Energy Production

Draft Measure: Develop renewable projects that can be co-located with existing water system infrastructure
Agencies: Energy Commission and Public Utilities Commission

Consistent with the Energy Commission's *2007 Integrated Energy Policy Report* (IEPR) recommendation to "establish a more cohesive statewide approach for renewables development that identifies preferred renewable generation and transmission projects in a 'road map' for renewables", the purpose of this measure is to identify and implement specific projects that take advantage of the state's water system-related opportunities to generate renewable electricity. Renewables are sources of energy that are naturally replenished, thus diminishing the supply problems potentially encountered with finite resources (i.e., fossil fuels). Examples of energy existing within water systems (water and wastewater projects) include water moving through conduits, sunlight, wind, and gases emitted from decomposing organic wastes. Producing energy from these resources at water and wastewater facilities will reduce greenhouse gas (GHG) emissions by offsetting the need for the facilities to consume electricity derived from natural gas and coal, which constitutes nearly 60 percent, on average, of electricity supplied by California's electric grid.

This measure is motivated by multiple objectives. In addition to GHG reduction, projects will help achieve the following benefits:

- Better management of on-site electricity load at water system sites
- Mitigation of electricity price volatility
- Contribution to meeting the RPS
- Disposal of organic wastes contained in wastewater in an environmentally-preferred manner

Implementation will involve four strategies:

1) Regulatory framework: CPUC implementation of AB 1969 (Yee, 2006) feed-in tariffs provides MPR-based fixed price contracts for excess electricity,
2) Encouraging use of existing financial incentives
3) Assessing economic potential to better target future incentives
4) Researching technologies to lower costs and improve performance.